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Dip Tanks For Type 1 Helicopter Operations

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LARGE VOLUME DIP TANKS

Helicopter bucket dipping with the largest capacity Griffith and Bambi buckets is possible using Type 1 (heavy) helicopters. Dip tanks of sufficient volume and depth allow Type 1 helicopter dipping in locations where large bodies of water are not near a fire. These tanks also are useful when groups of helicopters (Types 1, 2, or 3) need to be separated for flight safety by dipping water from different locations, or to keep chemicals away from a water source. Remote retardant bases are another application of large capacity tanks.

Two styles of large volume, free standing tanks are discussed in this Tech Tip: the soft-sided commercially marketed "pumpkin" tanks, and the hard-sided tanks constructed and used by Columbia Helicopters, Inc., and Erickson Air-Crane Co.

Pumpkin Tanks

Self-supporting open top water tanks, also called pumpkin tanks, are free standing with no external supports required. Constructed of vinyl coated polyester fabric, the pressure of the stored water shapes the tank and a buoyant collar maintains the opening at the top. When empty, these tanks are collapsible for transport. A variety of sizes are available. The largest holds 15,000 U.S. gallons and is shown in Figures 1 and 2.



Figure 1.—15,000 gallon pumpkin tank.



Figure 2.—Helicopter hovering to dip from tank.

Although the tanks are stable if filled and on level ground, tie-downs must be used for all sizes of helicopter dip tanks (empty or full) to secure the tanks against rotor wash. Synthetic rope (such as polypropylene), webbing, or metal cables with a minimum strength of 2000 pounds may be used. Tie-down loops or "D" rings are standard on the tanks. The purpose of the tie-down ropes is to secure empty tanks against rotor wash, not to keep a full tank from moving! Although Fireflex Manufacturing (U.S.A.), Inc., has successfully tested their 5000 gallon capacity (Model 5000E) tank on a 5 to 7 percent slope, our recommendation is that the tank should be on level ground.

Hard-Sided Tanks

Both Columbia Helicopters and Erickson Air-Crane have a rigid large volume tank which they use with Type 1 and smaller helicopters. Each helicopter



Figure 3.—Erickson Air-Crane S-64 snorkling water from steel tank.

company has constructed its own tank, but they are of similar size and construction. Neither company is currently marketing their tank.

Dimensions of the steel tank are about 10 feet in diameter by 8-feet tall, and hold approximately 4500 gallons. Empty weight is about 3000 pounds.

An axle and wheels on one side allow it to be towed to a location near the fire, or the tank can be slung under a helicopter using attached cables.

An Erickson S-64 helicopter is shown in figure 3 hovering to fill the helicopter's fixed tank from a steel dip tank.

PUMPKIN TANK USAGE EXAMPLES

A 15,000 gallon pumpkin tank was deployed on the Big Bar Complex fires (Region 5, Shasta Trinity NF) in 1991. Since both Type 1 and Type 2 helicopters initially were dipping from the same body of water, using the large tank as a second water source allowed separation of the heavy and medium helicopters. Three Type 2 helicopters dipped primarily out of the tank, although the Type 1 helicopters also used the tank successfully on a trial basis. The tank was refilled using eight water tenders. Approximately 300,000 gallons of water were dropped during the three days of fires.

As an example of the use of these tanks, consider the following hypothetical case. If six 4000 gallon water tenders with 500 gpm pumps are deployed with a 45-minute turnaround time, a Type I (heavy) helicopter with a 2600 gallon bucket could make 5-minute turnarounds. Ideally, 31,000 gallons could be delivered every hour if the water tenders kept the tank full between bucket dips. To do this, each water tender must make the trip from the time it disconnects from the tank, to filling the tender, to tank connection in a maximum of 36 minutes.

PUMPKIN TANK MANUFACTURERS

Two manufacturers, Fireflex Manufacturing Ltd., and U.S.A. Inc., and SEI Industries Ltd., produce 15,000 gallon pumpkin tanks.

SEI Industries

The SEI Industries' product line of "Buoywall" tanks are available in many sizes. The Buoywall Model 12000 is a 15,000 U.S. Gallon capacity tank that measures 37.5 inches x 24 inches x 62 inches when collapsed and has an empty weight of 250 pounds. When filled, the tank's outside diameter is 21.7 feet. The collar inside diameter is 12 feet and has an overall height of 7.75 feet. The 15,000 gallon tank has six outlets with three-inch NPT camlock fittings. Optional pads are available to protect against objects on the ground.

The table in the next column gives the Buoywall sizes recommended by SEI Industries for a 100 percent fill of some of the larger Bambi bucket models. Other bucket manufacturers exist, but no recommendations of bucket-to-tank combinations were available. Because of the height of the largest capacity buckets, the tank must be almost full to obtain a full bucket.

Table 1.

Bambi Bucket Model #	Empty Height Inches	Capacity U.S. Gal.	Buoywall Size U.S. Gal.
HL 5000	72	1320	12,000
HL 7600	86	2000	16,000
HL 9800	96	2600	20,000 *

*SEI is developing a 20,000 U.S. gallon capacity tank.

Fireflex Manufacturing

Fireflex Manufacturing's line of tanks are also available in a wide range of sizes. The Model 12000E is their largest capacity tank, holding 15,000 U.S. gallons. The dimensions and the empty weight are the same as those of the SEI 15,000 gallon tank. This tank also has six 3-inch standard discharge outlets. Ground pads are available as an option.

OTHER RELATED PRODUCTS

Containment berms are self-supported fabric liners with inflated sides or quickly erectable frames used for portable secondary containment of hazardous materials. These can be placed under the pumpkin tanks if spillage of chemicals is a concern and are available from both Mulligan & Associates and SEI Industries. Both of these organizations have demonstrated the ability to very quickly accommodate customers' specific needs, and can provide a variety of designs and sizes.

Griffith buckets are manufactured by Griffith Polymers and are available from Simplex Manufacturing Co. The largest Griffith bucket (Model 2000) holds 2000 U.S. gallons and is 82-inches tall. Both Erickson Air-Crane and Columbia Helicopters used the 2000 gallon Griffith buckets with their steel dip tanks on the Thompson Creek Fire (Region 1, Gallatin NF) in 1991. Because the Griffith bucket has a bottom-fill feature, a tank only needs to be as deep as the height of the bucket to fill it completely. The 2000 and 2600 gallon Bambi buckets cannot be used with the Erickson and Columbia steel tanks, because they require a larger inside diameter tank (12 feet is recommended).

AVAILABILITY

The 15,000 gallon tanks are a cache item available as a kit (Kit, Helicopter Dip Tank); NFES number 7329, and can be ordered from Region 5 North Zone Fire Cache.

Figure 4 shows a schematic of the tank with a material list of components included in the tank kit. The 100- and 150-foot lengths of hose going to each side of the tank allow the water tenders to get the closest connection.

Weight 632 pounds
284.4 kilograms
Cube 40.1 feet
1.4 meters

NFES 7329

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R-5 Specification
10 Box Set

Quantity	Unit	Ref#	Description
2	EA	1	BUSHING, PVC 4" x 3"
4	EA		GASKET, Hose, 3"
5	LG	5	HOSE, CSJRL, Double Jacket 2-1/2" NH X 50'
3	LG	3	HOSE, Suction, Rubber, 3" NH X 8' k/Kamlocks
2	EA	2	KAMLOCK MALE TO MALE #300F
2	EA	10	NIPPLE, 3" NPSH
1	EA	8	PAD, TANK
4	EA	9	PLUG, 4" PVC
1	EA	7	TANK, 15,000 Gallon Helicopter Dipable
2	EA	4	VALVE, Shutoff, Ball, 3" Kamlock X 2-1/2" NH-M
2	EA	6	VALVE, Shutoff, Ball, 2-1/2" NH-F X 3" NPSH-F

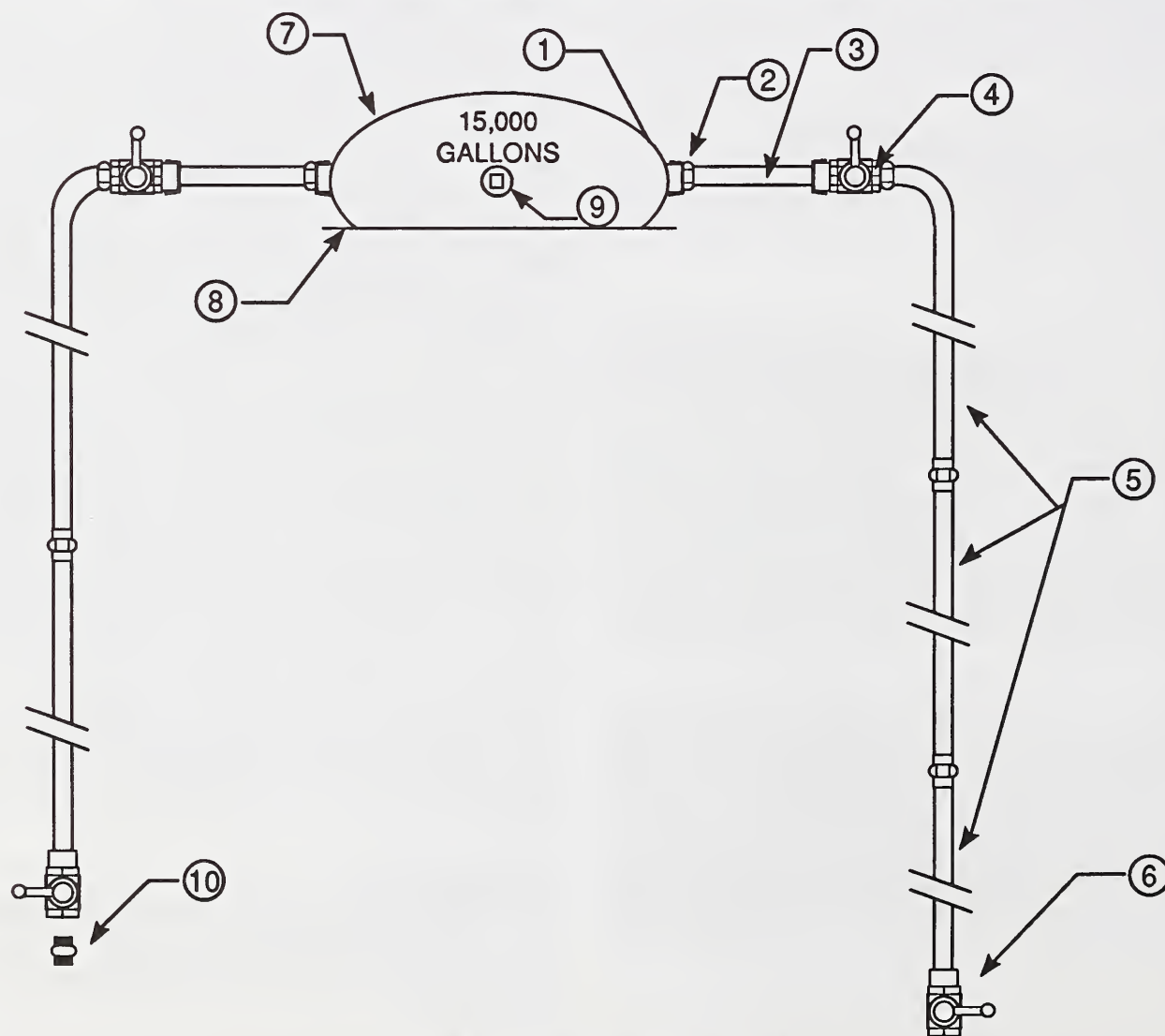


Figure 4.—Helicopter Dip Tank Kit

ADDITIONAL INFORMATION

Prices for the 15,000 gallon tanks vary, so it pays to shop around. The following manufacturers and distributors can provide pricing and additional information regarding the equipment:

SEI Industries Ltd. (Buoywall tanks and Bambi buckets)

7400 Wilson Avenue
Delta, BC Canada V4G 1E5
Phone: (604) 946-3131
FAX: (604) 940-9566

Fireflex Manufacturing Ltd.

#108, 20626 Mufford Crescent
Langley, BC Canada V3A 4P7
Phone: (604) 533-4268
FAX: (604) 530-6969

Simplex Manufacturing Co. (Distributor for Fireflex and Griffith)

13340 N.E. Whitaker Way
Portland, OR 97230
Phone: (503) 257-3511
FAX: (503) 257-8556

Mulligan & Associates (Distributor for Fireflex)

P.O. Box 524
Gresham, OR 97030-0074
Phone: (503) 668-9355 or, 24 hr: (503) 239-2311

LN Curtis & Sons (Distributor for Fireflex)

1800 Peralta Street
Oakland, CA 94607-1603
Phone: (510) 839-5111

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